

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of	:	Customer Number: 20277
HIKATA, Takeshi	:	Confirmation Number: 7075
Application No.: 10/590,011	:	Tech Center Art Unit: 1712
Filed: August 21, 2006	:	Examiner: HORNING, Joel G.
For: CATALYST STRUCTURE AND METHOD OF MANUFACTURING CARBON NANOTUBE USING THE SAME		

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed June 16, 2011, wherein Appellant appeals from the Primary Examiner's rejection of claims 1 and 3-6.

Real Party In Interest

This application is assigned to SUMITOMO ELECTRIC INDUSTRIES, LTD. by assignment recorded on August 21, 2006, at Reel 018226, Frame 0524.

Related Appeals and Interferences

Appellants are not aware of any related appeals and interferences.

Status of Claims

1. Claims canceled: 2 and 7.
2. Claims withdrawn from consideration, but not canceled: 8-15.
3. Claims pending: 1, 3-6, and 8-15.
4. Claims rejected: 1 and 3-6.
5. Claims on appeal: 1 and 3-6.

Status of Amendments

No amendments were filed subsequent to the Final Rejection of February 16, 2011.

Summary of Claimed Subject Matter

An aspect of the invention, per independent claim 1, is an assembly of a plurality of catalyst structures (21) for use in manufacturing carbon nanotubes of crystalline carbon by means of vapor deposition (page 5, lines 23-26 and page 9, lines 5-8 of the written description). The catalyst structure (21) is shaped as a pipe with its even upper surface (22) serving as a crystal growth surface (page 6, lines 1-4 and lines 21-22 of the written description). The catalyst structure (21) includes a catalytic material that forms a ring corresponding to a carbon nanotube on the crystal growth surface (22) (page 6, lines 17-20 of the written description). At least part of a side (25, 26) of the structure shaped as a pipe has a non-catalytic material with substantially no catalytic activity with respect to a growth of the crystalline carbon (page 6, lines 21-28 of the written description).

Grounds of Rejection To Be Reviewed By Appeal

1. Claims 1 and 3-5 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Delzeit (US 6,858,197).
2. Claim 6 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Delzeit in view of Fan et al. (Science vol. 283, pages 512-514, (1999)).

Argument

1. Rejection of claims 1 and 3-5 under 35 U.S.C. § 103(a) as being unpatentable over Delzeit.

The Examiner's Position:

The Examiner found that Delzeit teaches a catalyst structure having a multilayer catalyst material with an even surface and a first layer of non-catalytic aluminum, a second layer of catalytic iron, cobalt, or nickel covered by a third layer of catalytic molybdenum. The Examiner found that the catalyst structure can be formed into arrays of a variety of aperture patterns, shapes, and letters, and numbers, such as the number 8, which is a two pipe structure or zero, which would be a single pipe structure. The Examiner noted that Reference Nos. 42 or 45 of Fig. 4 are parts of the layered catalytic structure having substantially no catalytic activity.

Appellant's Position:

Delzeit does not suggest the claimed assembly of a plurality of catalyst structures because Delzeit does not suggest the catalyst structure is shaped as a pipe with its even upper surface serving as a crystal growth surface, the catalyst structure including a catalytic material that forms

a ring corresponding to a carbon nanotube on the crystal growth surface, and at least part of a side of the structure shaped as a pipe has a non-catalytic material with substantially no catalytic activity with respect to a growth of the crystalline carbon, as required by claim 1.

In the present invention, the catalytic material forms a ring in the crystal growth surface 22 where the whole of the catalyst structure is shaped as a pipe, as shown in Fig. 2C. Delzeit, on the other hand, discloses that the structure of the catalyst can be formed as the number 8, which is a two-ring shape where the whole of the structure is a layered structure, as shown in Figs. 1, 4, and 5. Delzeit, however, fail to teach or suggest that the catalyst structure is shaped as a pipe, as required by claim 1, because Delzeit does not disclose that at least a part of a side of the structure shaped as a pipe has a non-catalytic material, as required by claim 1. The portion of the structure relied on by the Examiner as having non-catalytic activity (Ref. Nos. 42 and 45 in Fig. 4) is not shaped as a pipe. Rather, layers 42 and 45 appear to be rectangular shape. Further, there is no suggestion that there is an opening formed in layers 42 and 45 which would correspond to the interior walls of a pipe. The Examiner has no basis for asserting that Delzeit teaches or suggest at least a part of a side of the structure shaped as a pipe has a non-catalytic material with substantially no catalytic activity with respect to a growth of the crystalline carbon, as required by claim 1. Even if the ring-shaped catalytic layer features disclosed by Delzeit were considered to be pipe-shaped, and Appellant does not agree they are pipe-shaped, it is only the catalytic layer that is "pipe-shaped," not the non-catalytic material layers.

In other words, Delzeit provide a very thin (0.1 - 20 nm) catalytic layer that is arguably pipe-shaped, on which a carbon nanotube is grown. The Examiner-asserted two-pipe catalytic structure is entirely formed of catalytic material. The two-pipe catalytic structure does not include at least part of a side of the structure shaped as a pipe having a non-catalytic material

with substantially no catalytic activity with respect to a growth of the crystalline carbon, as required by claim 1. The entire two-pipe catalytic structure of Delzeit is catalytic. Because Delzeit does not suggest at least part of a side of the structure shaped as a pipe has a non-catalytic material with substantially no catalytic activity with respect to a growth of the crystalline carbon, as required by claim 1, Delzeit does not suggest claim 1.

2. Rejection of claim 6 under 35 U.S.C. § as being unpatentable over Delzeit and Fan et al.

The Examiner's Position:

The Examiner acknowledged that Delzeit does not teach oxidizing the crystal growth surface. The Examiner relied on the teaching of Fan et al. of oxidizing the surface of iron as a catalyst material to assert it would have been obvious to substitute an iron catalyst of Delzeit with an iron oxide catalyst to produce predictable results.

Appellant's Position:

Delzeit and Fan et al., whether taken in combination, or taken alone, do not suggest the claimed assembly of a plurality of catalyst structures because Fan et al. do not cure the deficiencies of Delzeit. Fan et al. do not suggest the catalyst structure is shaped as a pipe with its even upper surface serving as a crystal growth surface, the catalyst structure including a catalytic material that forms a ring corresponding to a carbon nanotube on the crystal growth surface, and at least part of a side of the structure shaped as a pipe has a non-catalytic material with substantially no catalytic activity with respect to a growth of the crystalline carbon, as required by claim 1.

Conclusion

Based upon the arguments submitted supra, Appellant respectfully submits that the Examiner's rejections under 35 U.S.C. § 103 are not legally viable, and constitute reversible and harmful error. Appellant, therefore, respectfully solicits the Honorable Board to reverse the Examiner's rejections of claims 1 and 3-5 as being obvious as evidenced by Delzeit; and claim 6 as being obvious in view of Delzeit and Fan et al.

Respectfully submitted,

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as our correspondence address.**

CLAIMS APPENDIX

1. An assembly of a plurality of catalyst structures for use in manufacturing carbon nanotubes of crystalline carbon by means of vapor deposition, wherein
the catalyst structure is shaped as a pipe with its even upper surface serving as a crystal growth surface,

the catalyst structure includes a catalytic material that forms a ring corresponding to a carbon nanotube on the crystal growth surface, and

at least part of a side of said structure shaped as a pipe has a non-catalytic material with substantially no catalytic activity with respect to a growth of said crystalline carbon.

3. The assembly of a plurality of catalyst structures according to claim 1, wherein said non-catalytic material is made of one or more selected from the group consisting of Ag, Au, Ru, Rh, Pd, Os, Ir and Pt.

4. The assembly of a plurality of catalyst structures according to claim 1, wherein said catalytic material is made of one or more selected from the group consisting of Fe, Co, Mo and Ni, and said non-catalytic material is made of Ag and/or an Ag containing alloy.

5. The assembly of a plurality of catalyst structures according to claim 1, wherein said crystal growth surface has a multilayer structure with catalytic and non-catalytic material.

6. The assembly of a plurality of catalyst structures according to claim 1, wherein at least said crystal growth surface of said catalytic material is oxidized.

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EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.